

## Combined Test of Anterior Pituitary Function (2) - Glucagon, TRH, GnRH

Test Name: Please request tests separately (CHILD THYROTROPIN STIMULATION DFT, CHILD SYNACTHEN DFT, CHILD GNRH STIMULATION TEST, CHILD GLUCAGON STIMULATION FOR GROWTH HORMONE DFT)

### Principle

Simultaneous administration of GH stimulants and hypothalamic releasing hormones GnRH and TRH does not alter the hormonal response from that seen during a specific single provocation test. When multiple pituitary hormone deficiencies are suspected, it is practical and economical to carry out as many combined tests as possible.

### Indication

- Investigation of known/suspected multiple pituitary hormone disease.

### Precautions

- The GnRH test cannot be performed if the child has been primed with sex steroid to stimulate GH response.
- The test should not be performed on a patient with pheochromocytoma or insulinoma as it may provoke an attack.
- The test should not be carried out following starvation of >48 hours or in the presence of a glycogen storage diseases. The inability to mobilise glycogen may result in hypoglycaemia.
- The test should not be carried out in patients with severe hypocortisolaemia (9.00am level <100 nmol/L)
- Thyroid function must be normal as thyroxine deficiency may reduce the GH and cortisol response.

### Side Effects

- Glucagon can commonly result in nausea and abdominal pain (30%) and patients may rarely vomit.
- In children with suspected hypopituitarism prolonged fasting may induce hypoglycaemia. Blood glucose should be checked by POCT in these patients whenever a sample is taken.
- Asthmatic patients should be carefully monitored.
- TRH administration can give patients the desire to urinate. It is therefore advisable to ask older children to empty their bladder before commencing the test.
- Order the TRH (protirelin) from pharmacy at least 24 hours in advance.

### Preparation

- Patients should have water only for 8 hours prior to the test.

### Protocol

- Insert an indwelling 22-gauge, blue cannula and take a blood sample for growth hormone and U&E (t = -30). Cannulation may cause growth hormone to rise; therefore, the patient should rest for 30 min before the test is commenced.
- Take blood samples for growth hormone, cortisol, prolactin, TSH, fT4, LH, FSH, testosterone (boys) or oestradiol (girls; BASAL, t = 0). Check the patient's blood glucose level using a meter.
- Infusions and Injections**

<b>Generic</b>	<b>Route</b>	<b>Dose</b>	<b>Frequency</b>
Protirelin (TRH)	<i>i.v (slowly over 2 minutes)</i>	<i>5 micrograms/kg (to a maximum of 200 micrograms)</i>	<i>Bolus</i>

Generic	Route	Dose	Frequency
Glucagon	<i>i.m</i>	30 micrograms/kg of body weight up to a maximum dose of 1 mg.	Bolus

#### Gonadotrophin Releasing Hormone

Age	Generic	Route	Dose	Frequency
<1 year	Gonadorelin	<i>i.v</i>	2.5 micrograms/kg	Bolus
≥ 1 year	Gonadorelin	<i>i.v</i>	100 micrograms	Bolus

#### Time Points and samples:

Time (min) post infusions	Blood sample	Glucagon		TRH	GnRH	Extra Tests
		GH	Blood glucose meter	TSH	LH/FSH	
-30	1.2 mL Clotted 1.2 mL LiHep	+	+			U&E
0	1.2 mL Clotted 1.2 mL LiHep	+	+	+	+	Prolactin, FT4, LH, FSH, Testosterone or Oestradiol
20	1.2 mL Clotted 1.2 mL LiHep			+		
30	1.2 mL Clotted 1.2 mL LiHep				+	
60	1.2 mL Clotted 1.2 mL LiHep	+	+	+	+	
90	1.2 mL Clotted 1.2 mL LiHep	+	+			
120	1.2 mL Clotted 1.2 mL LiHep	+	+			
150	1.2 mL Clotted 1.2 mL LiHep	+	+			
180	1.2 mL Clotted 1.2 mL LiHep	+	+			

#### Samples

See table.

#### Interpretation

As for individual stimulation tests.

#### References

1. Brooks C., Clayton P. & Brown R. (2005) Brook's clinical paediatric endocrinology, 5<sup>th</sup> edition. Blackwell publishing, Oxford.